Wiring Requirements to Support Electronic Systems

CEDIA OUTREACH INSTRUCTOR

AIA Provider #G251
AIA course #CIO035

Credit(s) earned on completion of this course will be reported to AIA CES members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with the AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Course Description

Supporting the multitude of technologies found in today's connected homes requires planning, specialized installation, and a solid infrastructure in place. Attendees will discuss the trends and future technologies and their impact on today's homes, as well as be made aware of the basic infrastructure requirements needed to support these technologies so that they perform at maximum capacity. Participants will be able to define the components of a structured wiring system and list the benefits that correctly installed systems offer to their clients' technology needs. Attendees will also engage in discussion related to partnering with a trained electronics professional in the planning and installation of these complex systems.

This CEU is registered with the Interior Design Continuing Education Council (IDCEC) for continuing education credits. This credit will be accepted by the American Society of Interior Designers (ASID), International Interior Designers Association (IIDA) and Interior Designers of Canada (IDC).

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This program is registered for 0.1 CEU value. The IDCEC class-code will be provided by the instructor.

This CEU will be reported on your behalf to IDCEC and you will receive an email notification. Please log in and complete the electronic survey for this CEU. Certificates of completion will be automatically issued once you have submitted the online survey for this CEU. Attendees who do not belong to ASID, IIDA or IDC and do not have a unique IDCEC number will be provided with a Certificate of Completion after this CEU.

Learning objectives

- Outline today's consumer technology needs & expectations
- Define the technology offerings that can be incorporated in the home
  - Identify main components of a structured wiring system & the unique characteristics of:
    - ✓ Head end equipment
    - ✓ Cables:
      - Types of wire needed to support the technology
      - Digital conversion & its impact on home networks, cable & bandwidth requirements
      - Wireless & wired technology
    - ✓ Convenience outlets
  - Recognize the importance of proper design & documentation
  - Recognize the essential timeline for engaging an electronic systems professional in the design & build process

We all use technology every day…

Smartphones and devices

Cars

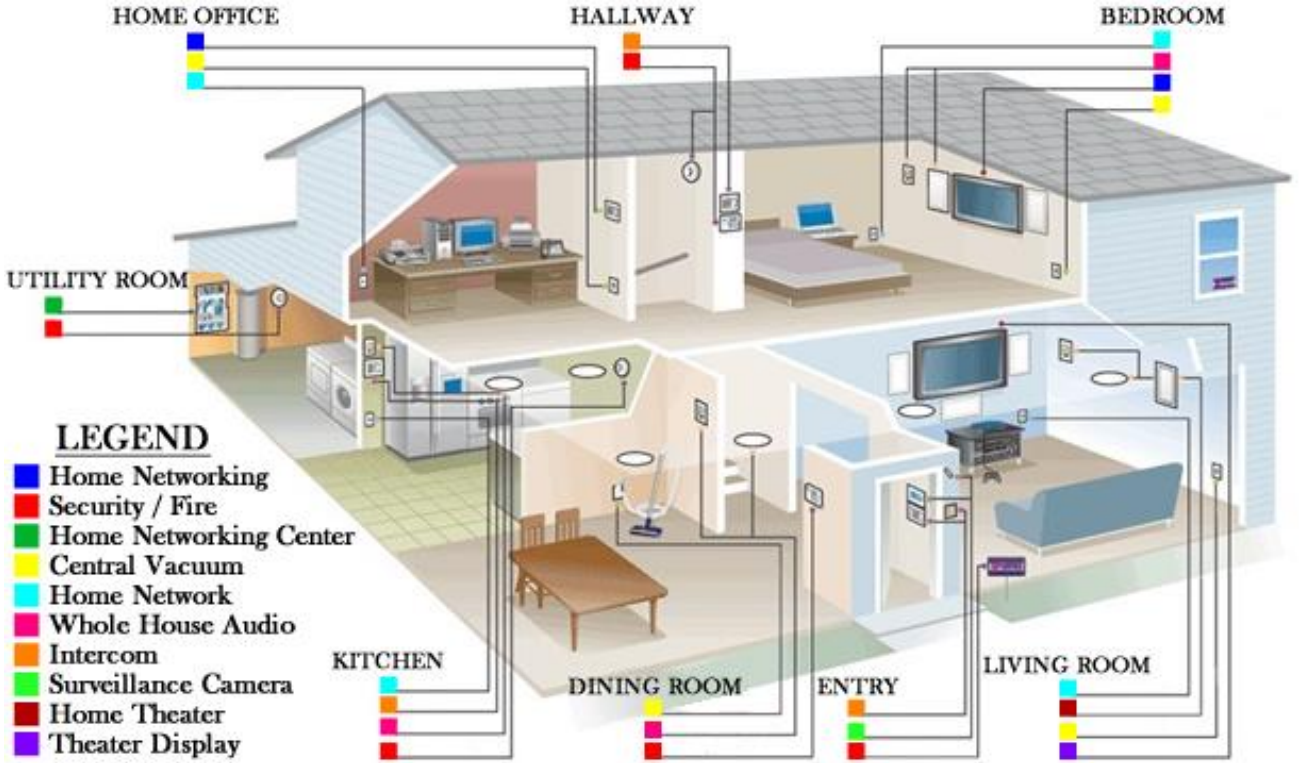
Photo courtesy of CBS Interactive

What technologies do clients expect in their homes?

Photo courtesy of Insight Home Solutions

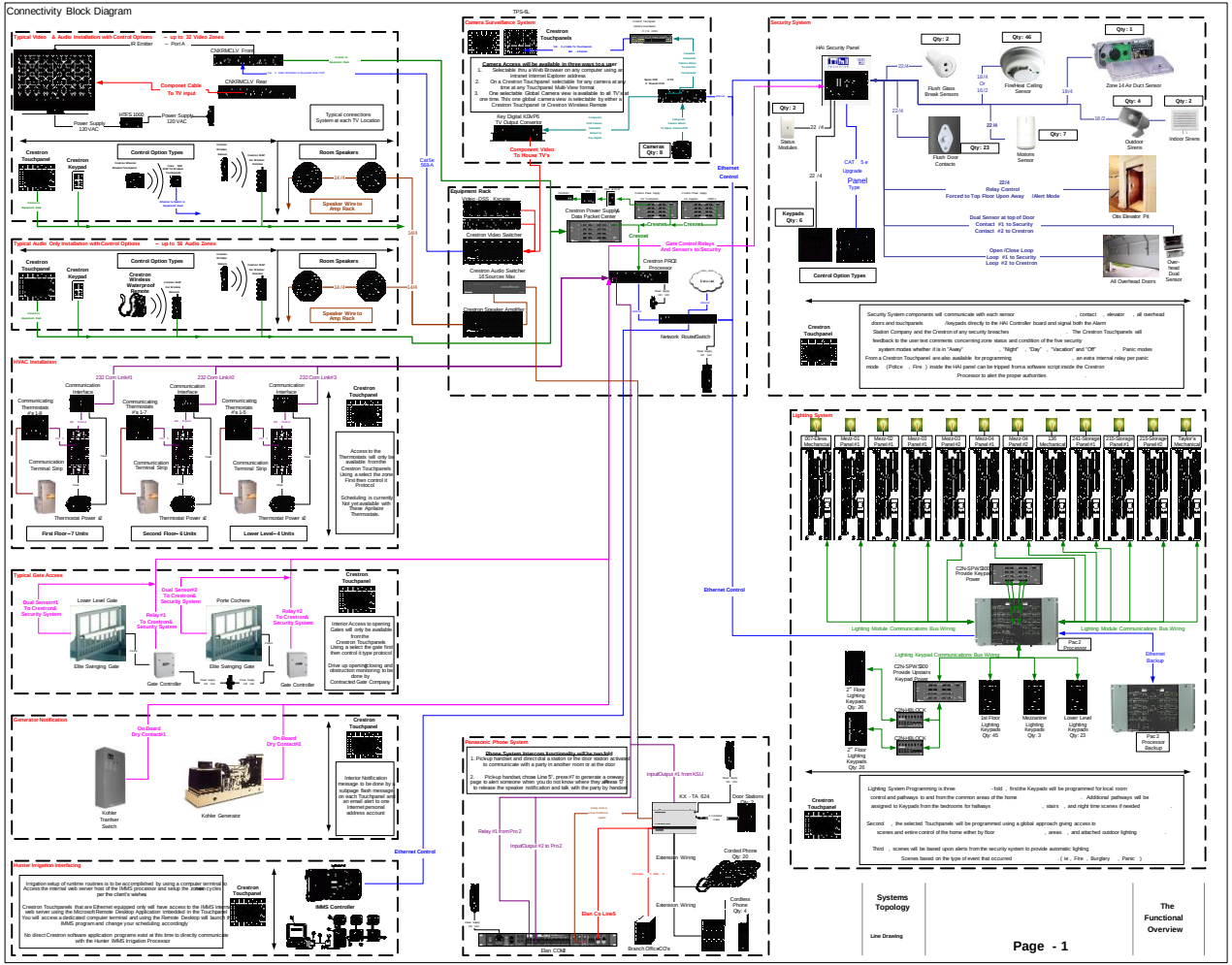
Technology options

Supporting these technologies



Graphic courtesy of The Sound Room

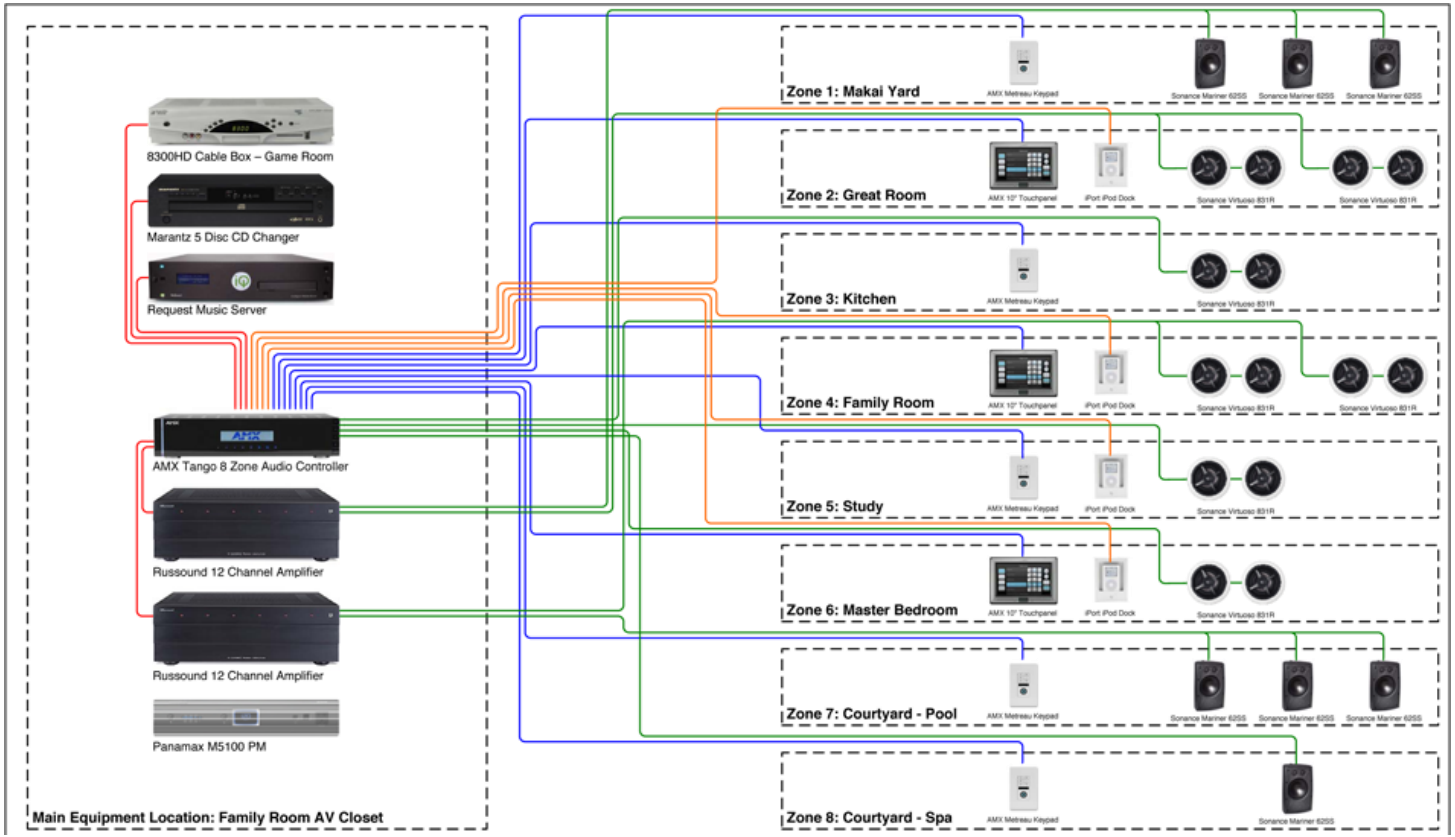
An overview of technology integration



Graphic courtesy of The Sound Room

Audio

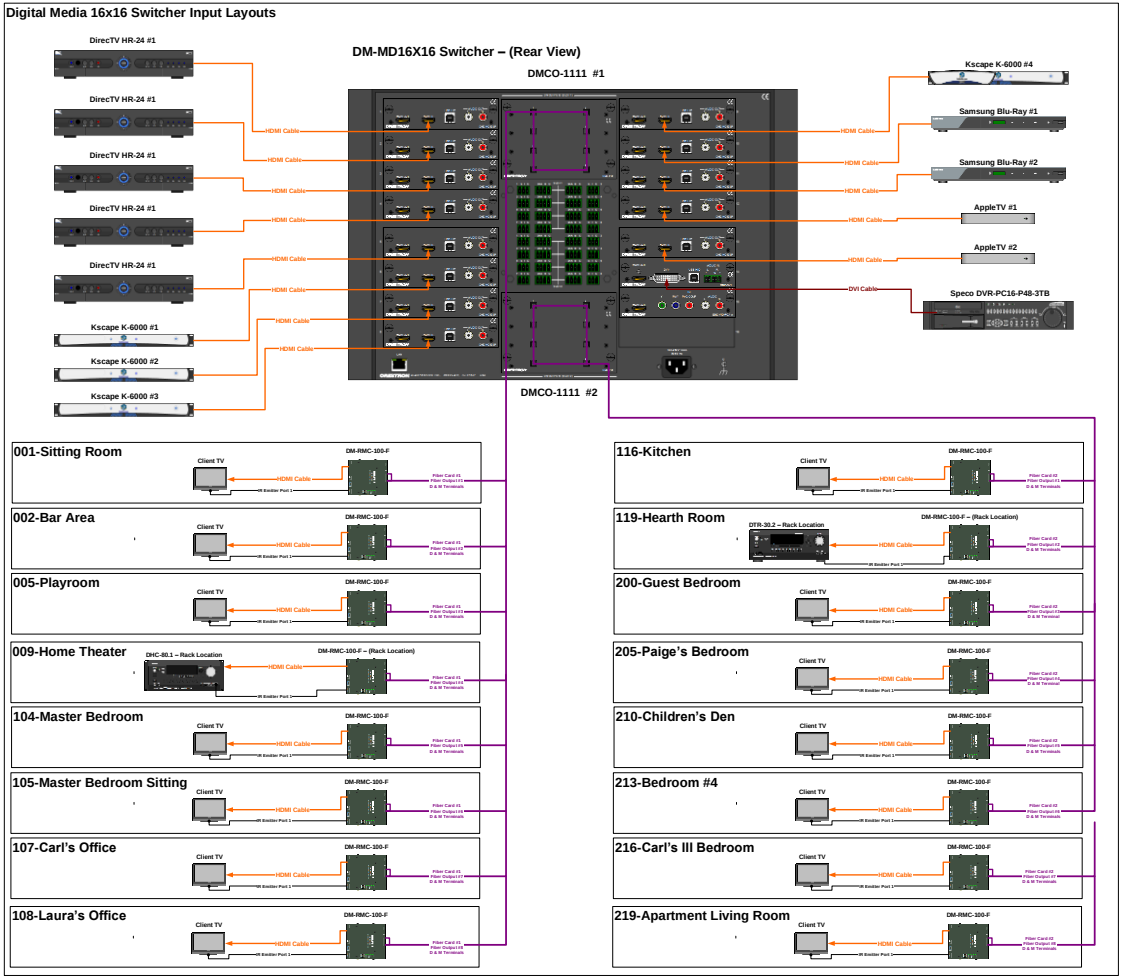
- Speaker wire
- Line level
- Category wire
- Digital audio


8300HD Cable Box – Game Room
Marantz 5 Disc CD Changer
Request Music Server
AMX Tango 8 Zone Audio Controller
Russound 12 Channel Amplifier
Russound 12 Channel Amplifier
Panamax M5100 PM
Main Equipment Location: Family Room AV Closet
Zone 1: Makai Yard
Zone 2: Great Room
Zone 3: Kitchen
Zone 4: Family Room
Zone 5: Study
Zone 6: Master Bedroom
Zone 7: Courtyard - Pool
Zone 8: Courtyard - Spa

Graphic courtesy of The Sound Room

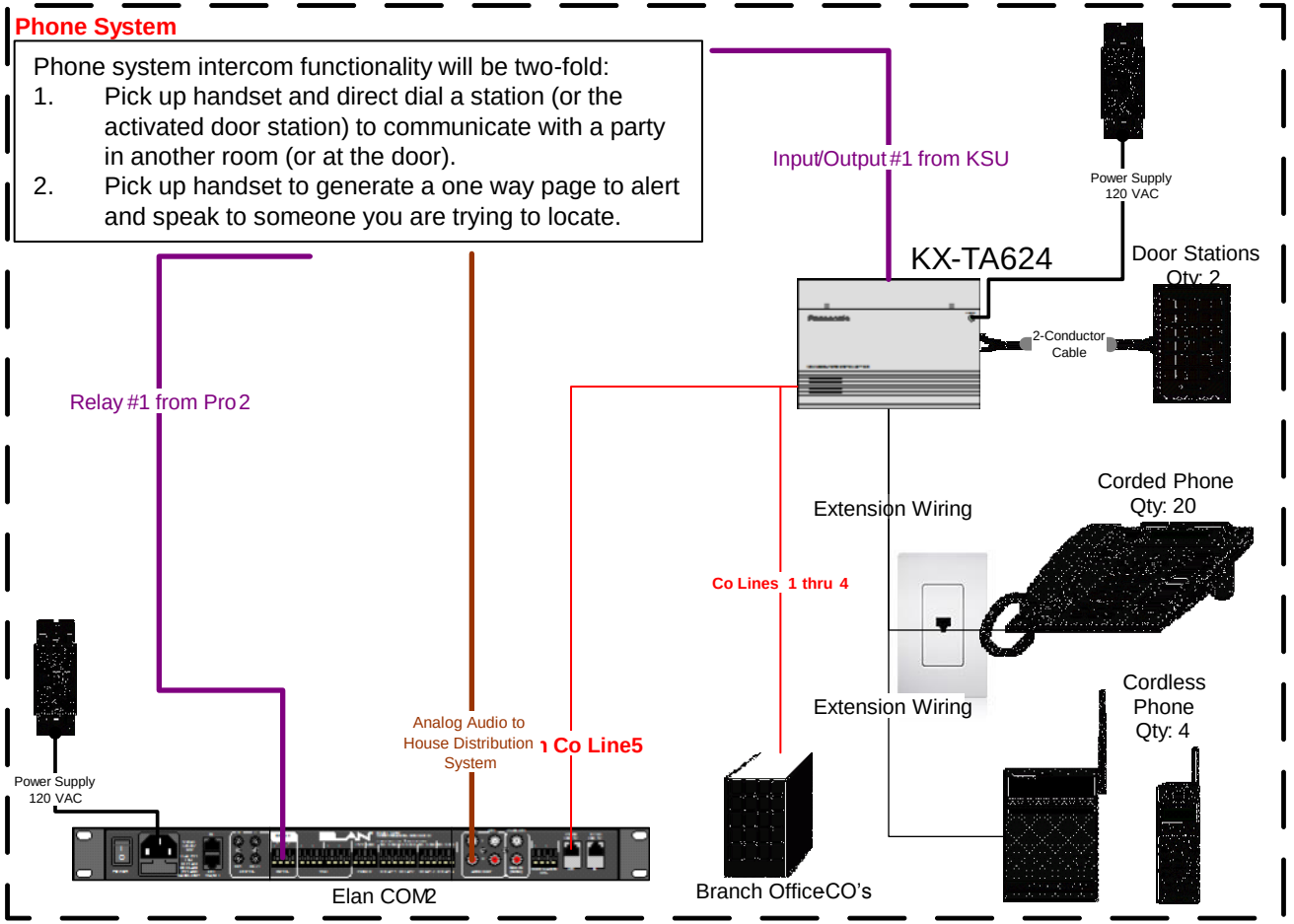
Video

- Coax cable
- Line level
- Category wire
- HDMI
- Multimode fiber



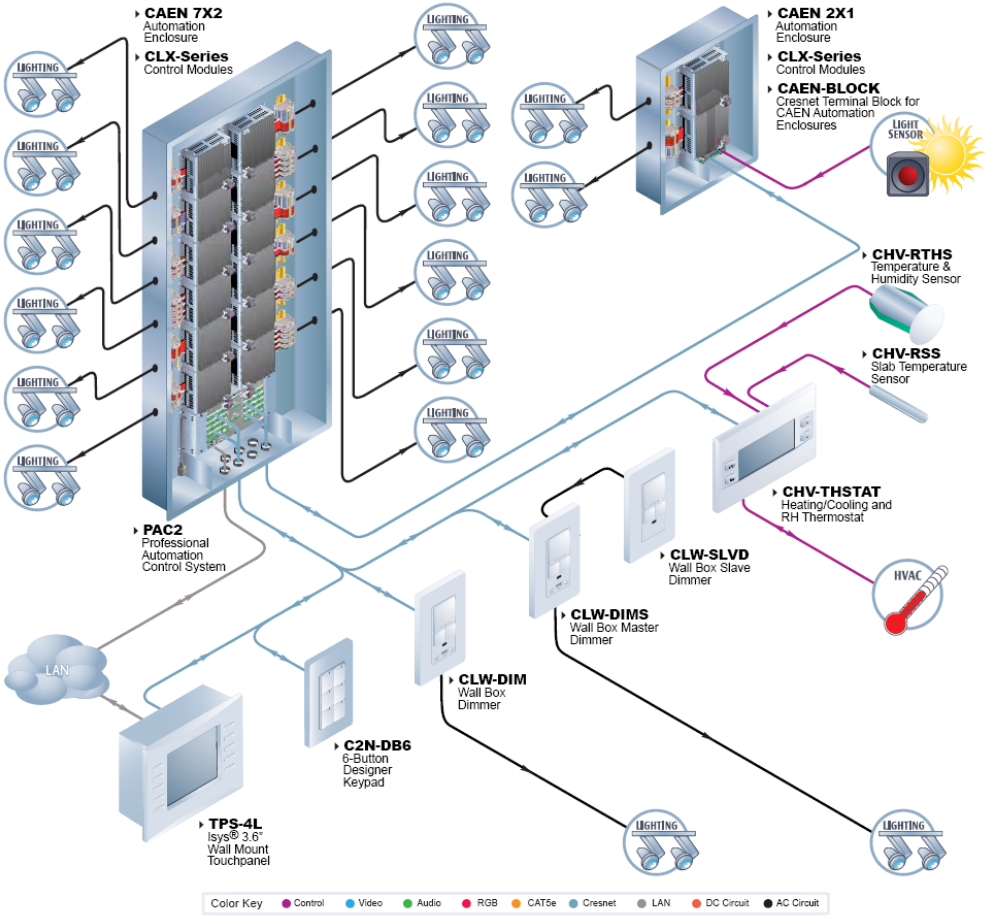
Graphic courtesy of The Sound Room

Voice


Phone System
Phone system intercom functionality will be two-fold:
1. Pick up handset and direct dial a station (or the activated door station) to communicate with a party in another room (or at the door).
2. Pick up handset to generate a one way page to alert and speak to someone you are trying to locate.
Input/Output #1 from KSU
Power Supply 120 VAC
KX-TA624
Door Stations Qty: 2
2-Conductor Cable
Relay #1 from Pro 2
Corded Phone Qty: 20
Extension Wiring
Co Lines 1 thru 4
Extension Wiring
Cordless Phone Qty: 4
Analog Audio to House Distribution System
Co Line5
Power Supply 120 VAC
Elan COM2
Branch OfficeCO's

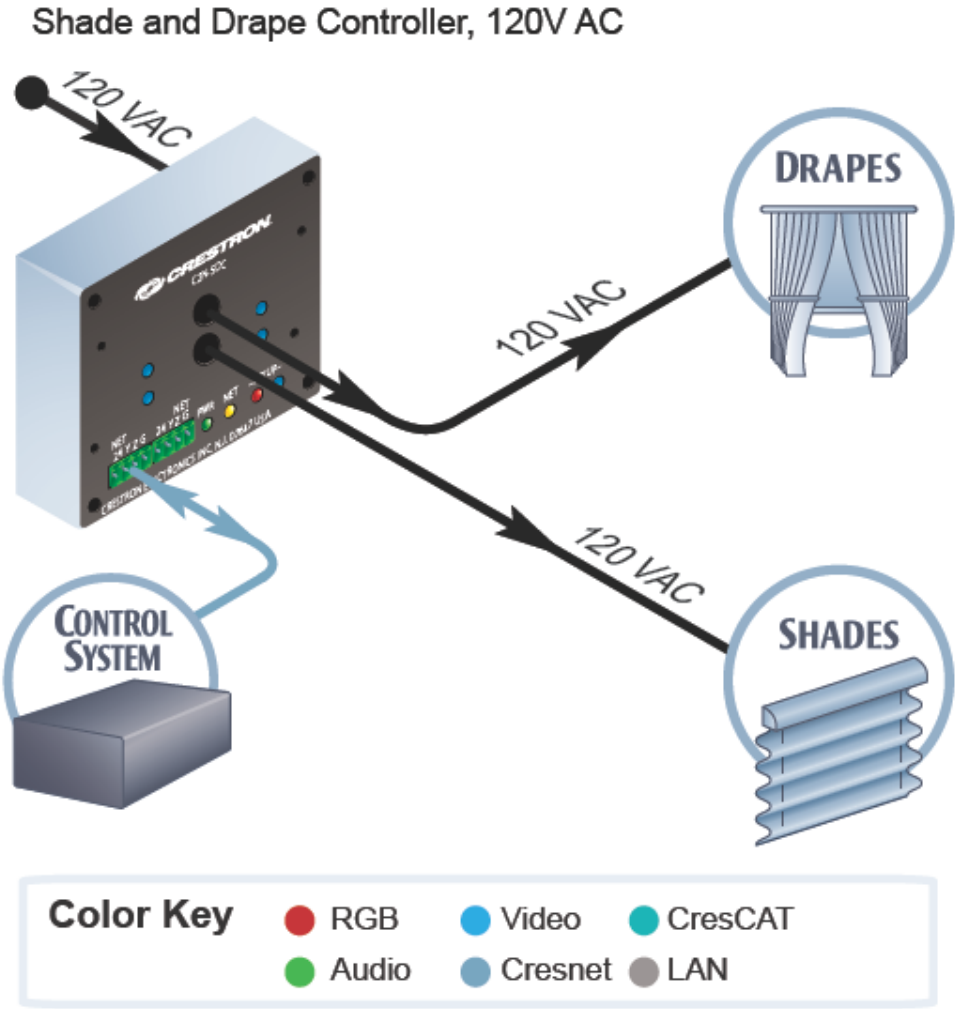
Graphic courtesy of The Sound Room

Lighting



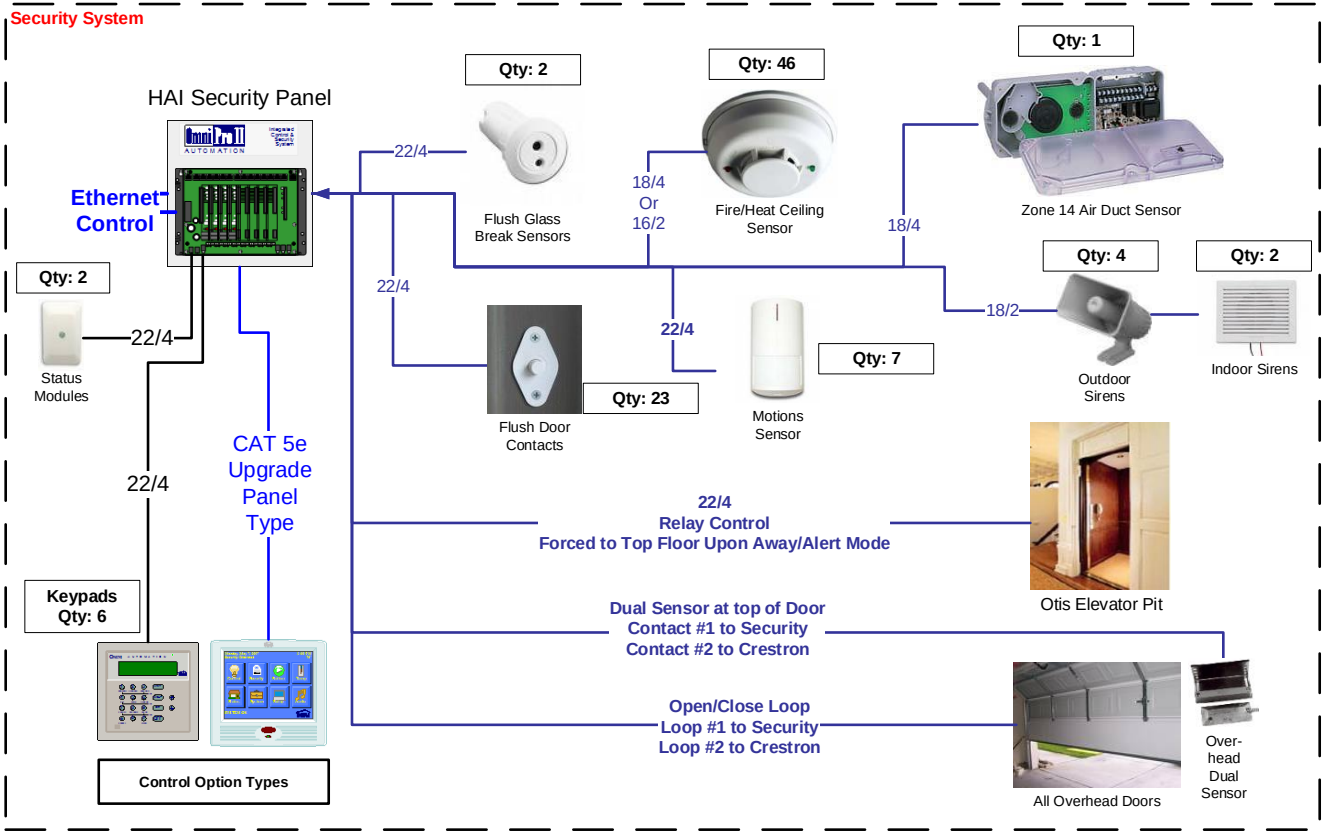
Graphic courtesy of The Sound Room

Shading



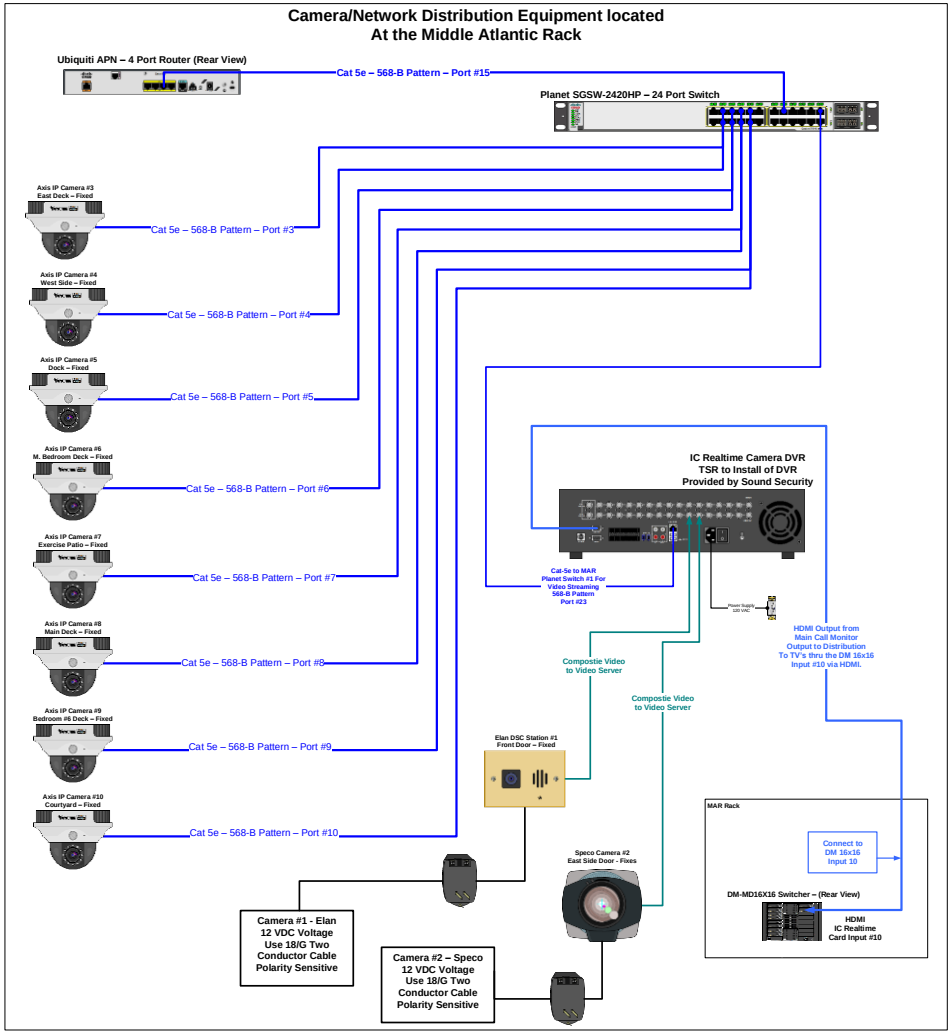
Graphic courtesy of The Sound Room

Security



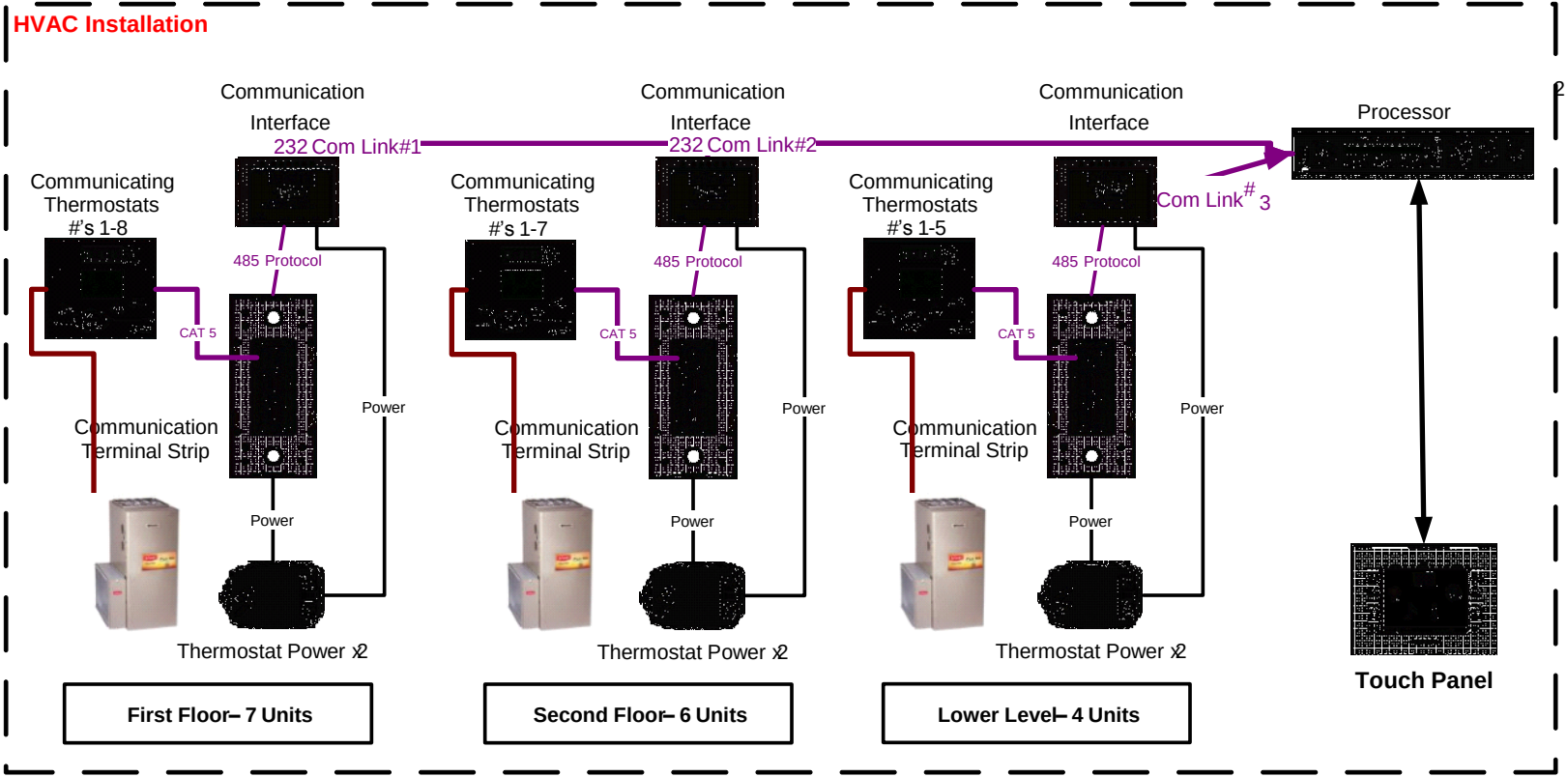
Graphic courtesy of The Sound Room

Cameras


Camera/Network Distribution Equipment located
At the Middle Atlantic Rack
Ubiquiti APN – 4 Port Router (Rear View)
Cat 5e – 568-B Pattern – Port #15
Planet SGSW-2420HP – 24 Port Switch
Axis IP Camera #3
East Deck – Fixed
Cat 5e – 568-B Pattern – Port #3
Axis IP Camera #4
West Side – Fixed
Cat 5e – 568-B Pattern – Port #4
Axis IP Camera #5
Dock – Fixed
Cat 5e – 568-B Pattern – Port #5
Axis IP Camera #6
M. Bedroom Deck – Fixed
Cat 5e – 568-B Pattern – Port #6
Axis IP Camera #7
Exercise Patio – Fixed
Cat 5e – 568-B Pattern – Port #7
Axis IP Camera #8
Main Deck – Fixed
Cat 5e – 568-B Pattern – Port #8
Axis IP Camera #9
Bedroom #6 Deck – Fixed
Cat 5e – 568-B Pattern – Port #9
Axis IP Camera #10
Courtyard – Fixed
Cat 5e – 568-B Pattern – Port #10
IC Realtime Camera DVR
TSR to Install of DVR
Provided by Sound Security
Cat-5e to MAR
Planet Switch #1 For
Video Streaming
568-B Pattern
Port #23
HDMI Output from
Main Call Monitor
Output to Distribution
To TV's thru the DM 16x16
Input #10 via HDMI
Compostie Video
to Video Server
Compostie Video
to Video Server
Elan DSC Station #1
Front Door – Fixed
Speco Camera #2
East Side Door - Fixes
MAR Rack
Connect to
DM 16x16
Input 10
DM-MD16X16 Switcher – (Rear View)
HDMI
IC Realtime
Card Input #10
Camera #1 - Elan
12 VDC Voltage
Use 18/G Two
Conductor Cable
Polarity Sensitive
Camera #2 – Speco
12 VDC Voltage
Use 18/G Two
Conductor Cable
Polarity Sensitive

Graphic courtesy of The Sound Room

HVAC

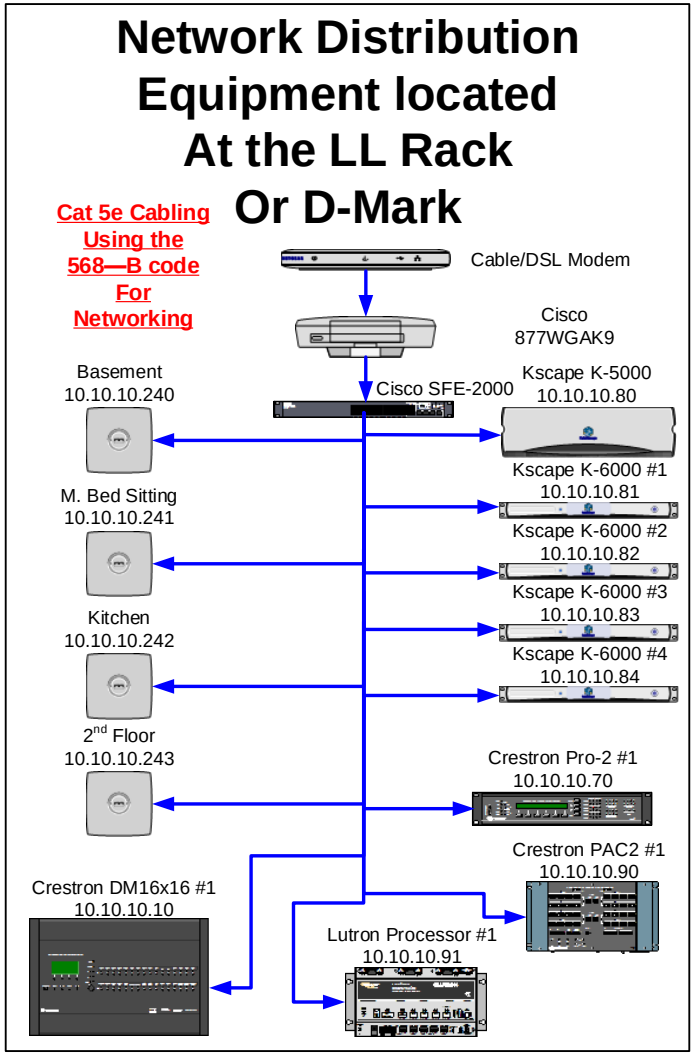


Graphic courtesy of The Sound Room

Health

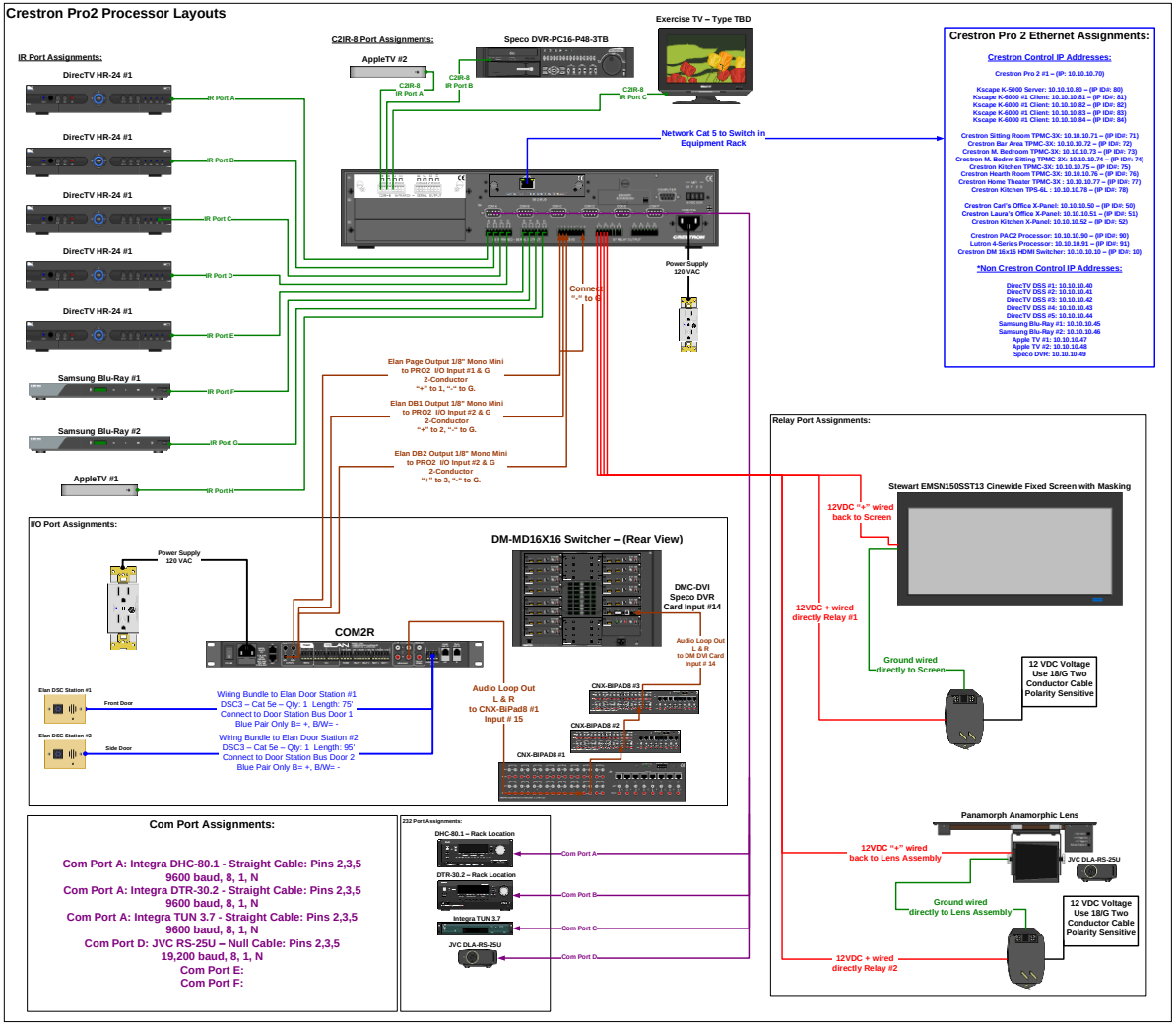
Photo courtesy of GrandCare Systems

Network



Graphic courtesy of The Sound Room

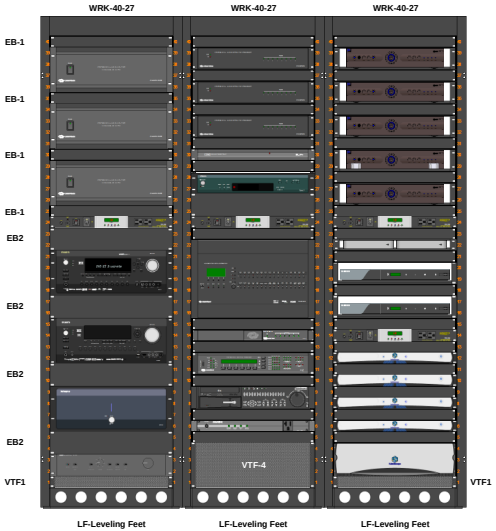
Control


Crestron Pro2 Processor Layouts
IR Port Assignments:
DirecTV HR-24 #1
DirecTV HR-24 #1
DirecTV HR-24 #1
DirecTV HR-24 #1
DirecTV HR-24 #1
Samsung Blu-Ray #1
Samsung Blu-Ray #2
AppleTV #1
IR Port A
IR Port B
IR Port C
IR Port D
IR Port E
IR Port F
IR Port G
IR Port H
C2IR-8 Port Assignments:
AppleTV #2
Speco DVR-PC16-P48-3TB
Exercise TV – Type TBD
C2IR-8 IR Port A
C2IR-8 IR Port B
C2IR-8 IR Port C
Network Cat 5 to Switch in Equipment Rack
Power Supply 120 VAC
Connect "-" to G
Elan Page Output 1/8" Mono Mini to PRO2 I/O Input #1 & G 2-Conductor "+" to 1, "-" to G.
Elan DB1 Output 1/8" Mono Mini to PRO2 I/O Input #2 & G 2-Conductor "+" to 2, "-" to G.
Elan DB2 Output 1/8" Mono Mini to PRO2 I/O Input #2 & G 2-Conductor "+" to 3, "-" to G.
Crestron Pro 2 Ethernet Assignments:
Crestron Control IP Addresses:
Crestron Pro 2 #1 – (IP: 10.10.10.70)
Kscape K-5000 Server: 10.10.10.80 – (IP ID#: 80)
Kscape K-6000 #1 Client: 10.10.10.81 – (IP ID#: 81)
Kscape K-6000 #1 Client: 10.10.10.82 – (IP ID#: 82)
Kscape K-6000 #1 Client: 10.10.10.83 – (IP ID#: 83)
Kscape K-6000 #1 Client: 10.10.10.84 – (IP ID#: 84)
Crestron Sitting Room TPMC-3X: 10.10.10.71 – (IP ID#: 71)
Crestron Bar Area TPMC-3X: 10.10.10.72 – (IP ID#: 72)
Crestron M. Bedroom TPMC-3X: 10.10.10.73 – (IP ID#: 73)
Crestron M. Bedrm Sitting TPMC-3X: 10.10.10.74 – (IP ID#: 74)
Crestron Kitchen TPMC-3X: 10.10.10.75 – (IP ID#: 75)
Crestron Hearth Room TPMC-3X: 10.10.10.76 – (IP ID#: 76)
Crestron Home Theater TPMC-3X : 10.10.10.77 – (IP ID#: 77)
Crestron Kitchen TPS-6L : 10.10.10.78 – (IP ID#: 78)
Crestron Carl's Office X-Panel: 10.10.10.50 – (IP ID#: 50)
Crestron Laura's Office X-Panel: 10.10.10.51 – (IP ID#: 51)
Crestron Kitchen X-Panel: 10.10.10.52 – (IP ID#: 52)
Crestron PAC2 Processor: 10.10.10.90 – (IP ID#: 90)
Lutron 4-Series Processor: 10.10.10.91 – (IP ID#: 91)
Crestron DM 16x16 HDMI Switcher: 10.10.10.10 – (IP ID#: 10)
*Non Crestron Control IP Addresses:
DirecTV DSS #1: 10.10.10.40
DirecTV DSS #2: 10.10.10.41
DirecTV DSS #3: 10.10.10.42
DirecTV DSS #4: 10.10.10.43
DirecTV DSS #5: 10.10.10.44
Samsung Blu-Ray #1: 10.10.10.45
Samsung Blu-Ray #2: 10.10.10.46
Apple TV #1: 10.10.10.47
Apple TV #2: 10.10.10.48
Speco DVR: 10.10.10.49
I/O Port Assignments:
Power Supply 120 VAC
COM2R
DM-MD16X16 Switcher – (Rear View)
DMC-DVI Speco DVR Card Input #14
Audio Loop Out L & R to DM DVI Card Input # 14
Audio Loop Out L & R to CNX-BiPad8 #1 Input # 15
CNX-BIPAD8 #3
CNX-BIPAD8 #2
CNX-BIPAD8 #1
Elan DSC Station #1
Front Door
Elan DSC Station #2
Side Door
Wiring Bundle to Elan Door Station #1 DSC3 – Cat 5e – Qty: 1 Length: 75' Connect to Door Station Bus Door 1 Blue Pair Only B= +, B/W= -
Wiring Bundle to Elan Door Station #2 DSC3 – Cat 5e – Qty: 1 Length: 95' Connect to Door Station Bus Door 2 Blue Pair Only B= +, B/W= -
Relay Port Assignments:
Stewart EMSN150SST13 Cinewide Fixed Screen with Masking
12VDC "+" wired back to Screen
12VDC + wired directly Relay #1
Ground wired directly to Screen
12 VDC Voltage Use 18/G Two Conductor Cable Polarity Sensitive
Panamorph Anamorphic Lens
12VDC "+" wired back to Lens Assembly
JVC DLA-RS-25U
Ground wired directly to Lens Assembly
12 VDC Voltage Use 18/G Two Conductor Cable Polarity Sensitive
12VDC + wired directly Relay #2
Com Port Assignments:
Com Port A: Integra DHC-80.1 - Straight Cable: Pins 2,3,5 9600 baud, 8, 1, N
Com Port A: Integra DTR-30.2 - Straight Cable: Pins 2,3,5 9600 baud, 8, 1, N
Com Port A: Integra TUN 3.7 - Straight Cable: Pins 2,3,5 9600 baud, 8, 1, N
Com Port D: JVC RS-25U – Null Cable: Pins 2,3,5 19,200 baud, 8, 1, N
Com Port E:
Com Port F:
232 Port Assignments:
DHC-80.1 – Rack Location
DTR-30.2 – Rack Location
Integra TUN 3.7
JVC DLA-RS-25U
Com Port A
Com Port B
Com Port C
Com Port D

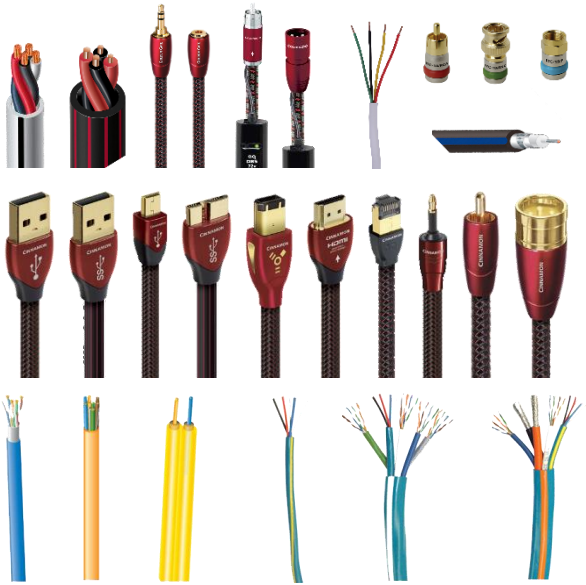
Graphic courtesy of The Sound Room

Structured wiring

Head End Equipment



Cables



Convenience Outlets

Graphics courtesy of Audio Quest and Crestron

Head end equipment rack

- EIA 19” standard equipment width
- Range of heights and depths
- Stand alone or gangable configurations
- Lacing bars used for neat wiring
- Requires thermal planning for cooling
- Should be centrally located in a home

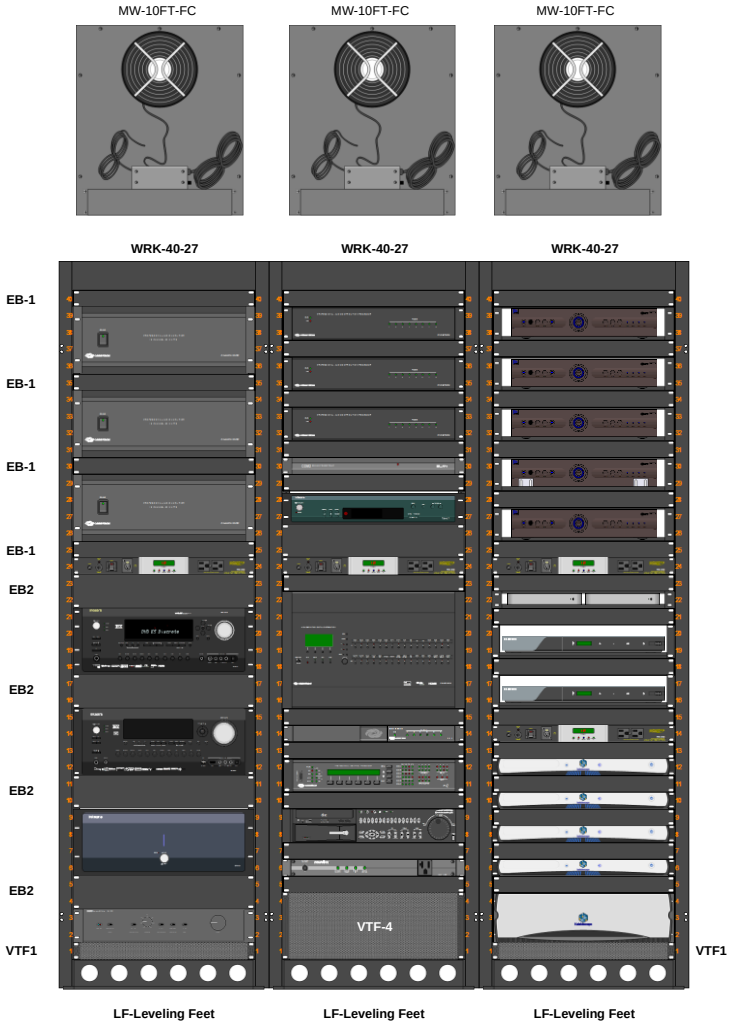


Photo courtesy of The Sound Room

Head end low voltage enclosure

Enclosure with cover

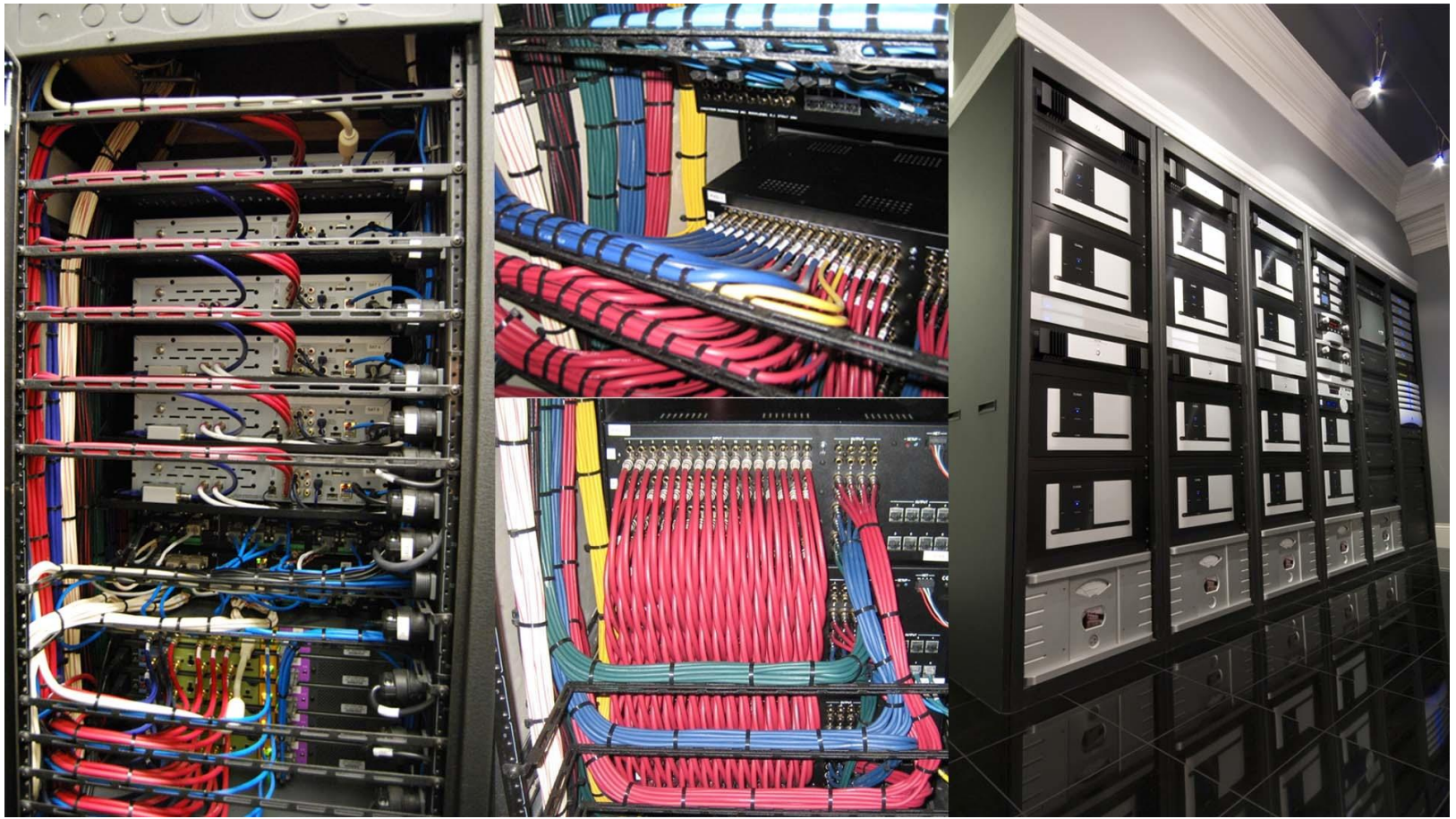
Security

Phone & LAN

Single inclusive low voltage enclosure

Photos courtesy of The Sound Room

Head end equipment

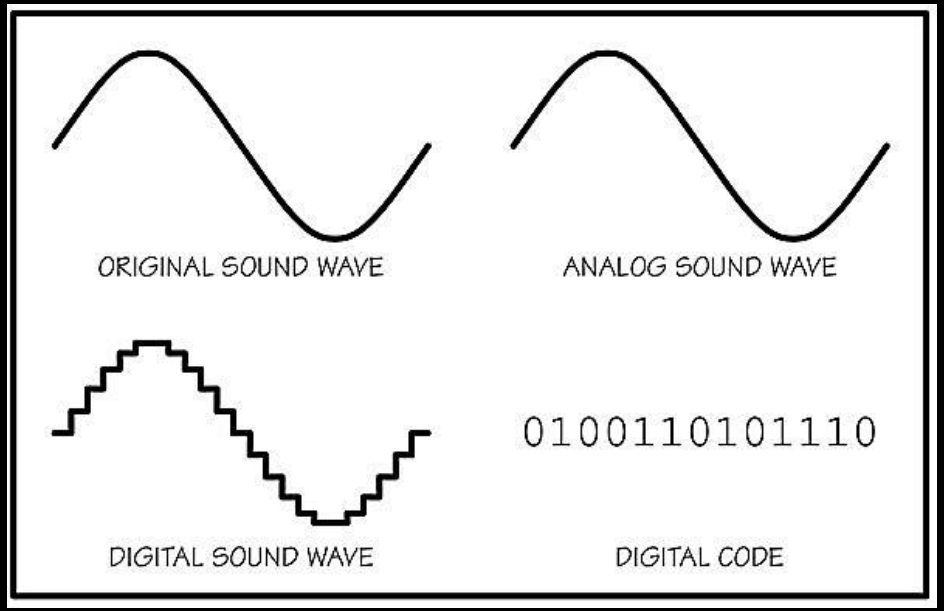


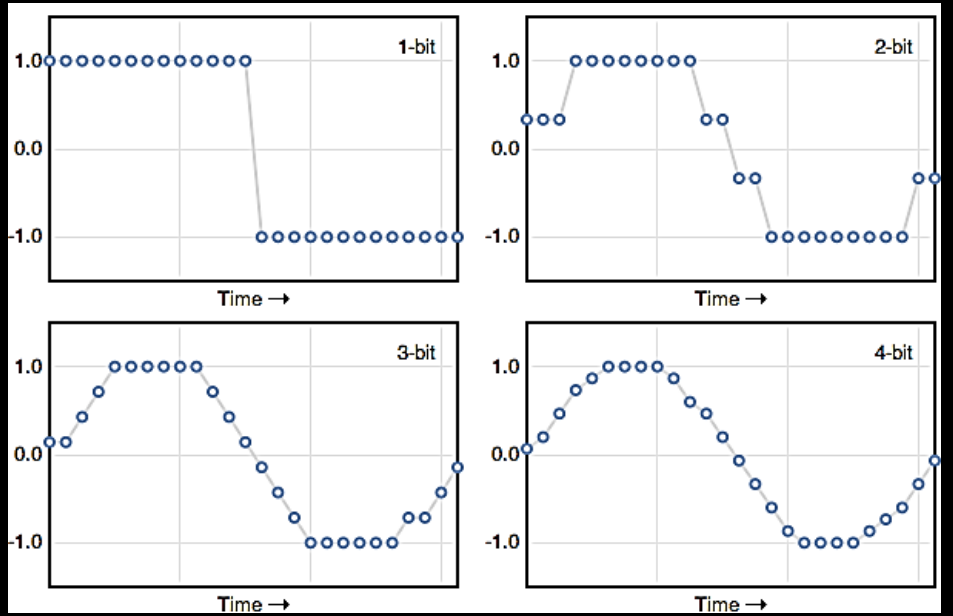
Photos courtesy of The Sound Room

Wireless vs. Wired

Analog

Digital





Analog cables

Stranded Speaker Wire

Solid Core Speaker Wire

3.5 mm

RCA Audio

Balanced Audio

Security 22/4

RCA

BNC

F

RG-6 Coax

Digital cables

OEM & Combination cables

DM NP

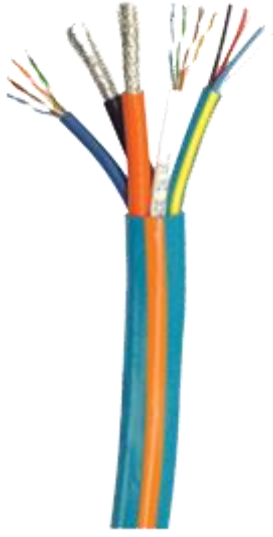
Multi-mode Fiber

Single-mode Fiber

Cresnet NP

4-CAT5 22/4

2-CAT5 2-Coax 22/4



Convenience outlets

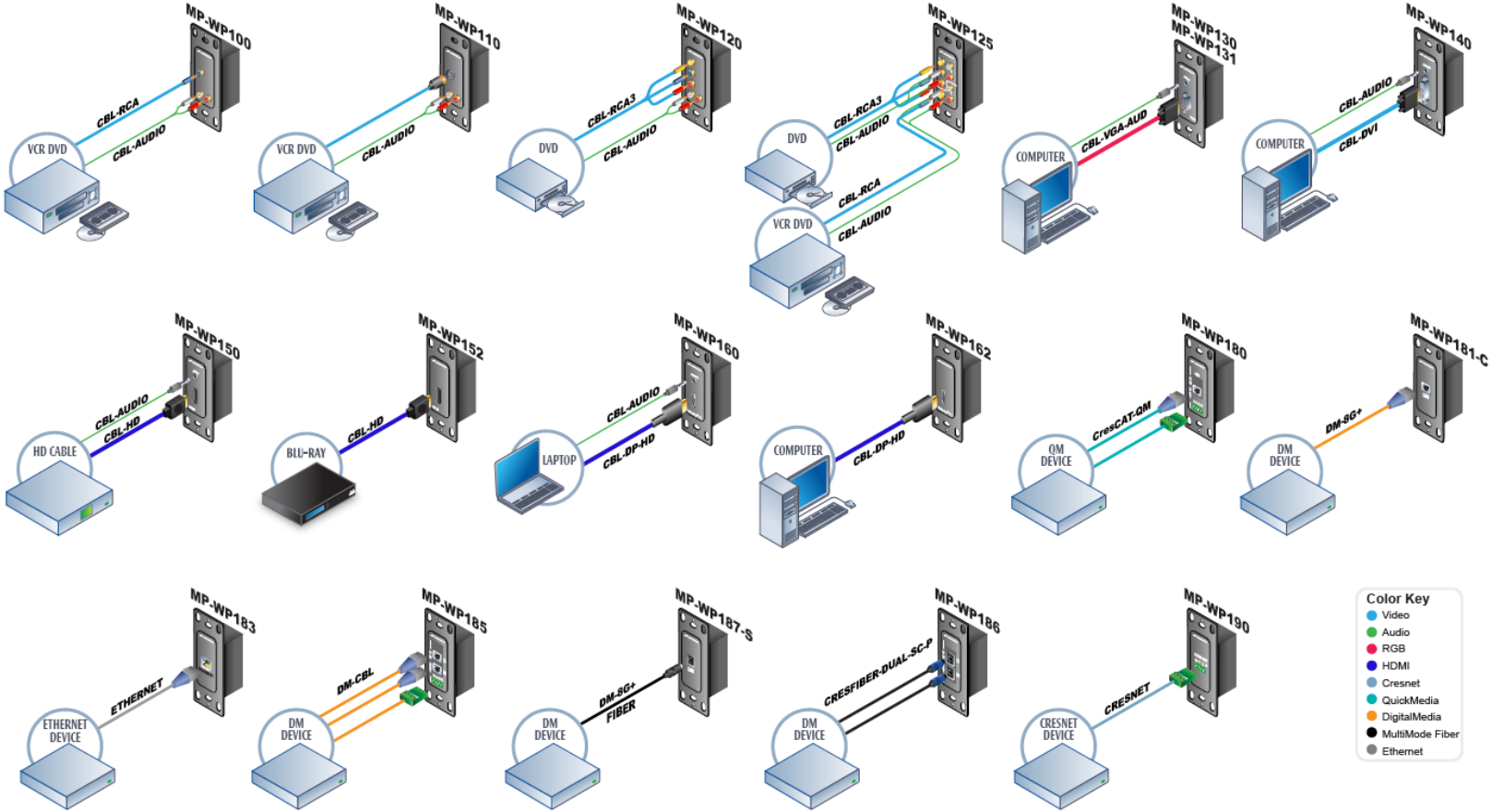


Photo courtesy of The Sound Room

It’s all about planning…

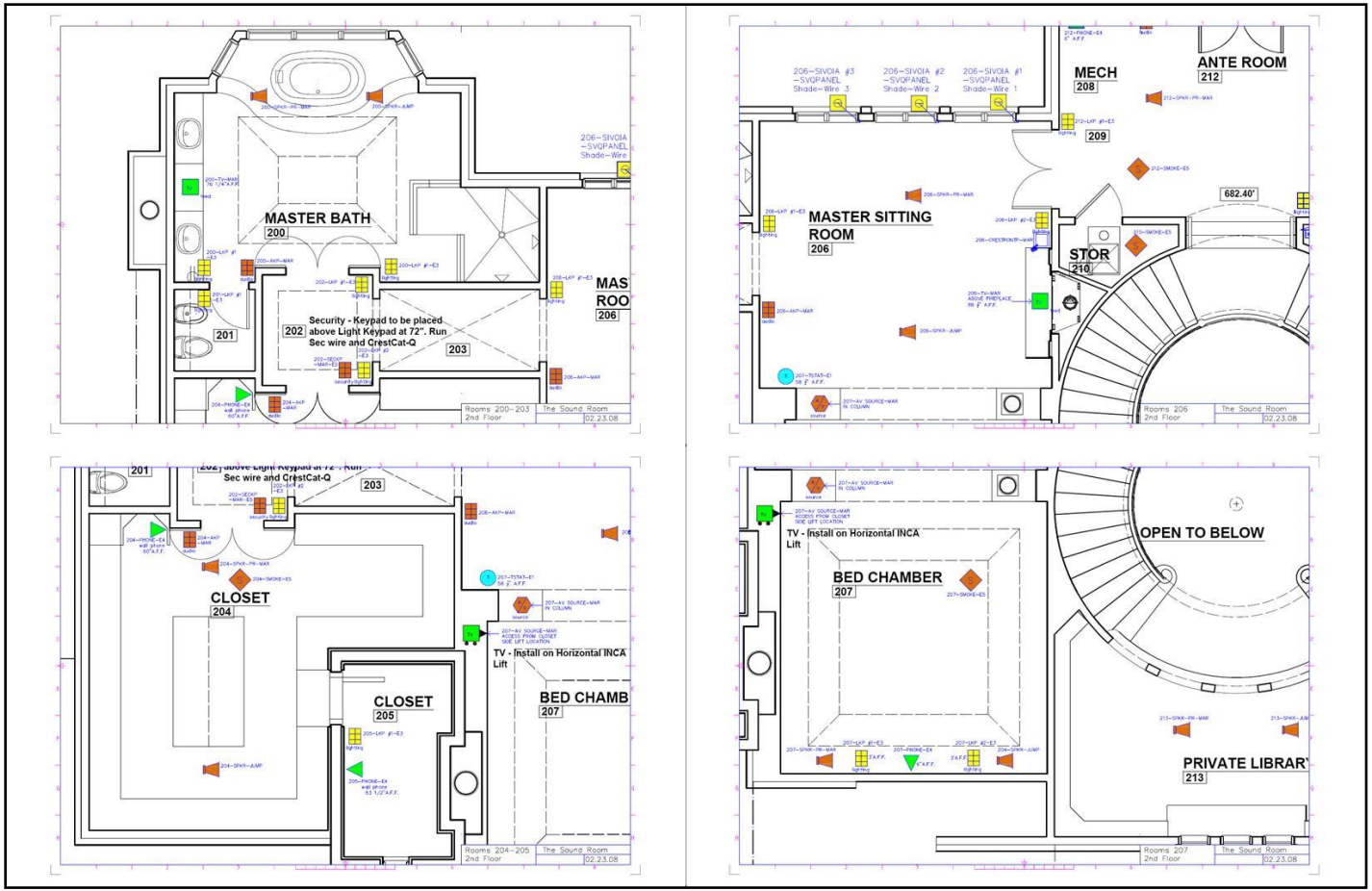


Photo courtesy of The Sound Room

Summary of discussion

- Outlined today's consumer technology needs & expectations
- Defined the technology offerings that can be incorporated in the home
- Identified main components of a structured wiring system & the unique characteristics of:
  - ✓ Head end equipment
  - ✓ Cables
  - ✓ Convenience outlets
- Recognized the importance of proper design & documentation
- Recognized the essential timeline for engaging an electronic systems professional in the design & build process

This concludes the American Institute of Architects (AIA) Continuing Education Systems (CES) program.

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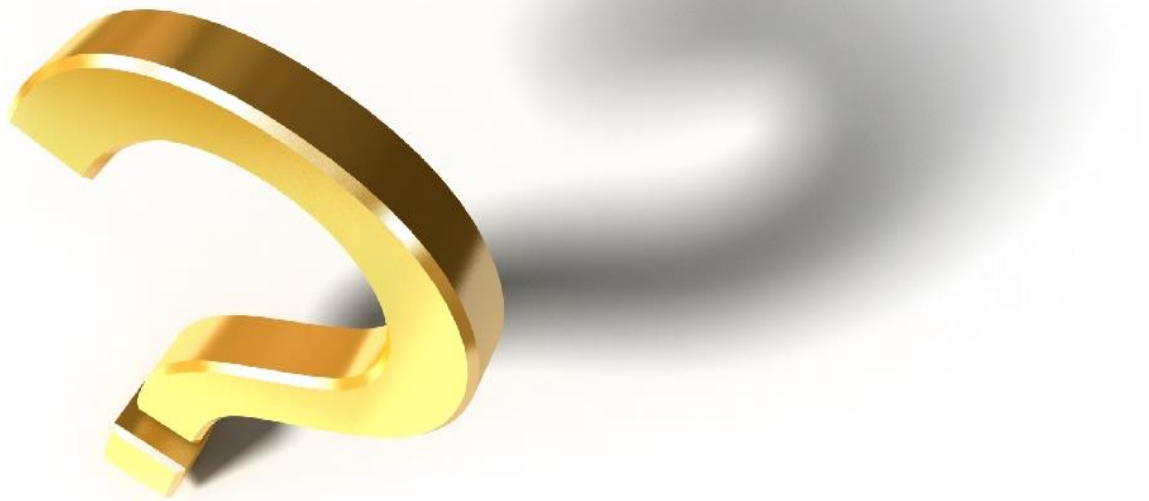

Thank you—what questions do you have?